

## **SERIES 100 / S115, S125 and S135 COMPUTER SYSTEMS**

### **FEATURES**

- Concurrent Time-Sharing, Multi-Batch, Remote Job Entry and Real-Time Processing
- Seven Programming Languages
- Demand Paging Virtual Memory Operating System
- Data Base Management System
- Comprehensive Line of Peripherals



**HARRIS**  
COMPUTER SYSTEMS



## **SERIES 100/SYSTEMS 115, 125 and 135**

The Harris Series 100 family is comprised of high-performance, disc-based, virtual memory computer systems for performing concurrent time-sharing, multi-batch, remote job entry and real-time processing. The S115, S125 and S135 are building-block systems — each may be easily expanded to support a variety of applications and performance levels. Upgrades between systems are also available. Series 100 systems provide cost-effective solutions for distributed data processing, transaction-oriented processing and communications applications. Data Base Management software is available for fast, efficient file maintenance. These multi-use systems are ideal for scientific, commercial and real-time applications — since they provide true multi-programming and multi-lingual capabilities.

### **SOFTWARE**

#### **VULCAN Operating System**

The Virtual Memory Manager (VULCAN) is a priority-structured, demand paged, multiprogramming operating system. VULCAN concurrently supports multi-level batch processing, interactive terminal time-sharing, transaction-oriented processing, multiple remote job entry and real-time operations. Under VULCAN, the virtual memory hardware/software system is transparent to the user. Up to 768K bytes (K=1024) per user is available — of which up to 192K bytes may be pure reentrant procedure.

#### **Support Software**

The field-proven VULCAN operating system supports seven languages, five support programs and a programmable macro job control command language. Also available as options are the Harris TOTAL data base management system, interactive QUERY language, four remote job entry support packages and two remote batch terminal host packages.

#### **Languages**

- FORTRAN IV Compiler with extensions
- Interactive BASIC Compiler with extensions
- 1974 ANSI COBOL Compiler
- RPG II Compiler
- Harris MACRO Assembler
- SNOBOL 4 Interpreter
- FORGO (Diagnostic Load-and-Go FORTRAN Compiler)

#### **Support Programs**

- Sort/Merge
- Indexed Sequential File Handler
- System Accounting
- Cross Reference
- VBUG Symbolic Debugger

#### **Remote Job Entry (RJE) Support Packages**

- IBM HASP II M/L
- IBM 2780
- CDC UT-200
- UNIVAC 1004

#### **Remote Batch Terminal (RBT) Host Packages**

- IBM HASP II M/L
- IBM 2780

#### **Data Base Management Systems (DBMS)**

- TOTAL Basic
- TOTAL Central
- Interactive QUERY and Update

Harris TOTAL — the most widely used of all the Data Base Management Systems — is known for its efficient implementation, low memory requirements and ease of use. TOTAL DBMS supports network and hierarchal data structures.

### **HARDWARE**

#### **Virtual Memory System**

The Harris Series 100 virtual memory hardware/software system controls the transfer of user data and programs in 3K byte (K=1024) segments — called “pages” — between the main memory and an external disc storage device. When a non-resident page is referenced, an executive interrupt is generated to cause VULCAN to perform the page swap. This operation, termed “demand paging”, allows concurrent execution of multiple programs by loading only the required pages into real memory. If additional memory is available, multiple pages of the same program can be resident.

These program pages do not require contiguous memory locations — which minimizes memory fragmentation and provides the maximum utilization of available total real memory. Consequently, demand paging permits the computer system to run programs of a larger size than the allocated physical main memory within the processor.

### Processor Features

The Harris Series 100 processor for systems 115, 125 and 135 contains the following standard features:

- Paging Hardware
- MOS Memory with Error Correction
- Priority Interrupt Control System
- Hardware Multiply/Divide/Square Root
- Program Halt/Address Trap
- Bit Processor
- Executive Traps
- 120 Hz Clock
- Stall Alarm
- Programmer's Control Panel
- Interval Timer
- Power Failure Shutdown
- Hardware Bootstraps
- Appropriate I/O channel type for each peripheral device controller in the system.

Featuring a 300 nanosecond micro-cycle, a central dual-word system bus, MOS memory with error correction, bipolar microprocessor arithmetic-logic unit (ALU), microcode execution PROM, bootstrap PROM, and several types of DMA I/O channels — the CPU architecture incorporates the latest technology in micro-programmed computers. Since the Channel-Unit I/O structure is consistent with all Harris computer systems, a comprehensive peripheral product line is available.

### OPTIONS

Listed below are many of the memory and mainframe options available to enhance the performance of the Series 100/Systems 115, 125 and 135.

- 48K Byte MOS Memory increment (with Error Correction)
- Scientific Arithmetic Unit (SAU) — available on S125 and S135 — a hardware floating-point processor for the high-speed execution of double-precision floating-point arithmetic (39-bit mantissa and an 8-bit exponent)
- 100K Hz Real-Time Clock
- MOS Data Save
- Programmed I/O (PIO) Channels
- Direct Memory Access (DMA) Channels (IBC, UBC and XBC)
- Additional Priority Interrupt Levels
- Expansion Pack — including I/O chassis and power supplies (available on S125, only)
- Run Time Meter

### COMMUNICATIONS EQUIPMENT

- Communications Multiplexer with Synchronous and Asynchronous Line Interface Units
- DMA Communications Processor with Synchronous and Asynchronous Ports
- Buffered and unbuffered terminals

### PERIPHERAL EQUIPMENT

The Harris Series 100 systems can be expanded and enhanced by selection of various peripheral equipment offered with each system, including:

- Moving Head Discs (40, 80, 150 and 300M Bytes)
- Cartridge Discs (10.8M Bytes)
- Fixed Head Discs (.5, .8, 1.1, 1.7 and 2.1M Bytes)
- Floppy Discs (310K Bytes)
- Magnetic Tapes (45, 75, 100, 150 and 200 ips)
- Card Readers (300, 600 and 1000 cpm)
- Card Reader/Punch (500/100 cpm)
- Line Printers (300, 600 and 900 lpm)
- Paper Tape Devices
- Console Devices, Local and Remote Terminals
- Supplementary equipment to meet most custom requirements



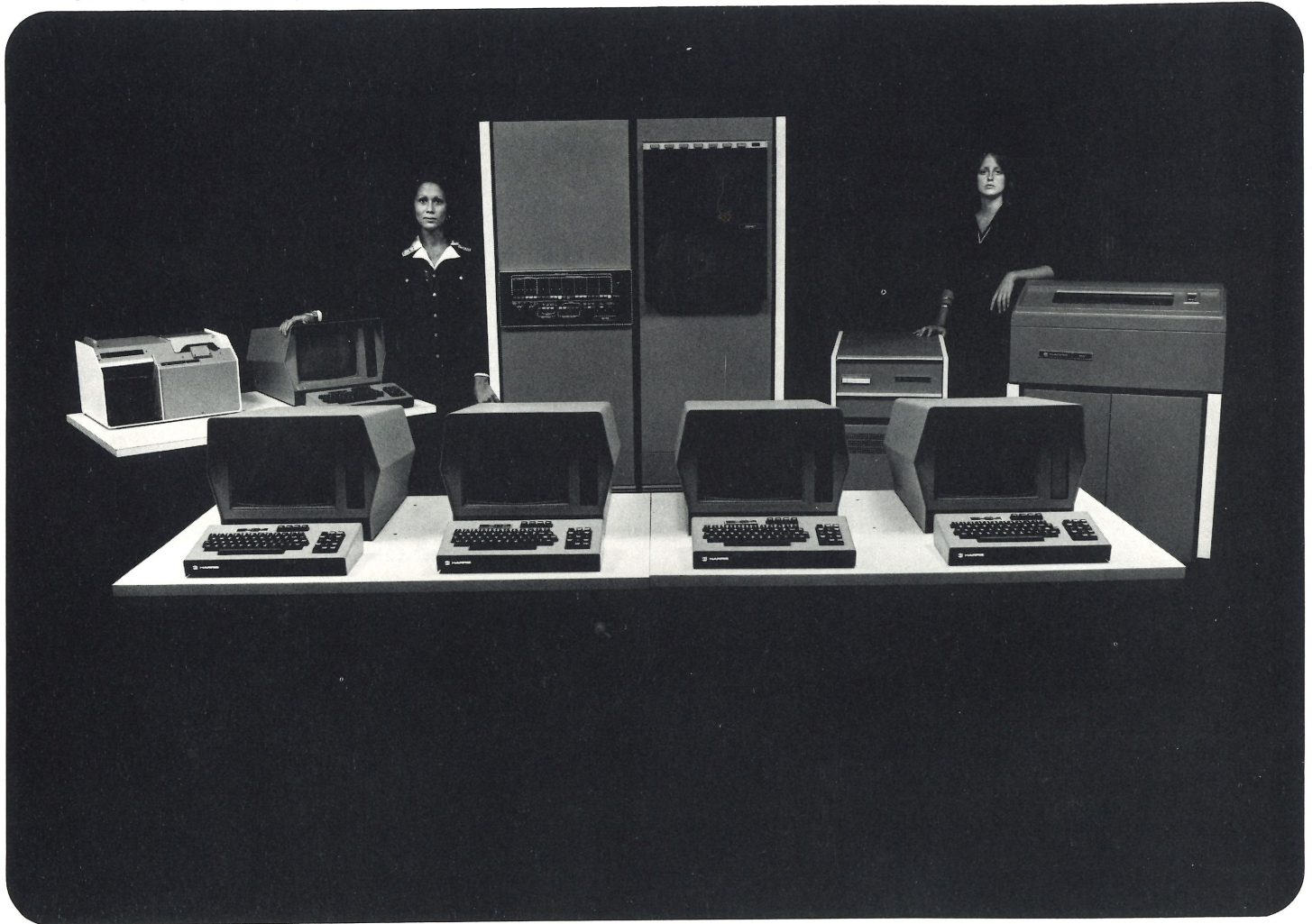
## SERIES 100/SYSTEM 115

System 115 is the basic building block of the Harris Series 100 Computer Systems. Like the S125 and the S135, the S115 can handle a variety of tasks — ranging from data base transactions to scientific research. System 115 is ideally suited for distributed processing applications that require multi-use concurrency. With 768K bytes of virtual memory and a communications multiplexer, System 115 can satisfy the local processing demands of up to eight interactive terminal users — while simultaneously communicating with another, remote Harris system or other mainframe (IBM, CDC and Univac).

The Harris System 115 is comprised of:

- Series 100 CPU (Model 6-5) with 144K Bytes of MOS Memory with Error Correction (expandable to 192K Bytes)
- 768K Bytes of Virtual Memory
- System CRT with Keyboard and Controller
- 10.8M Byte Cartridge Disc with Controller
- 9 Track, 800 BPI, 45 IPS Magnetic Tape Unit with Controller
- Communications Multiplexer, excluding line interface units
- All Processors and Support Libraries
- Virtual Memory Manager (VULCAN) Operating System

## TYPICAL SYSTEM 115





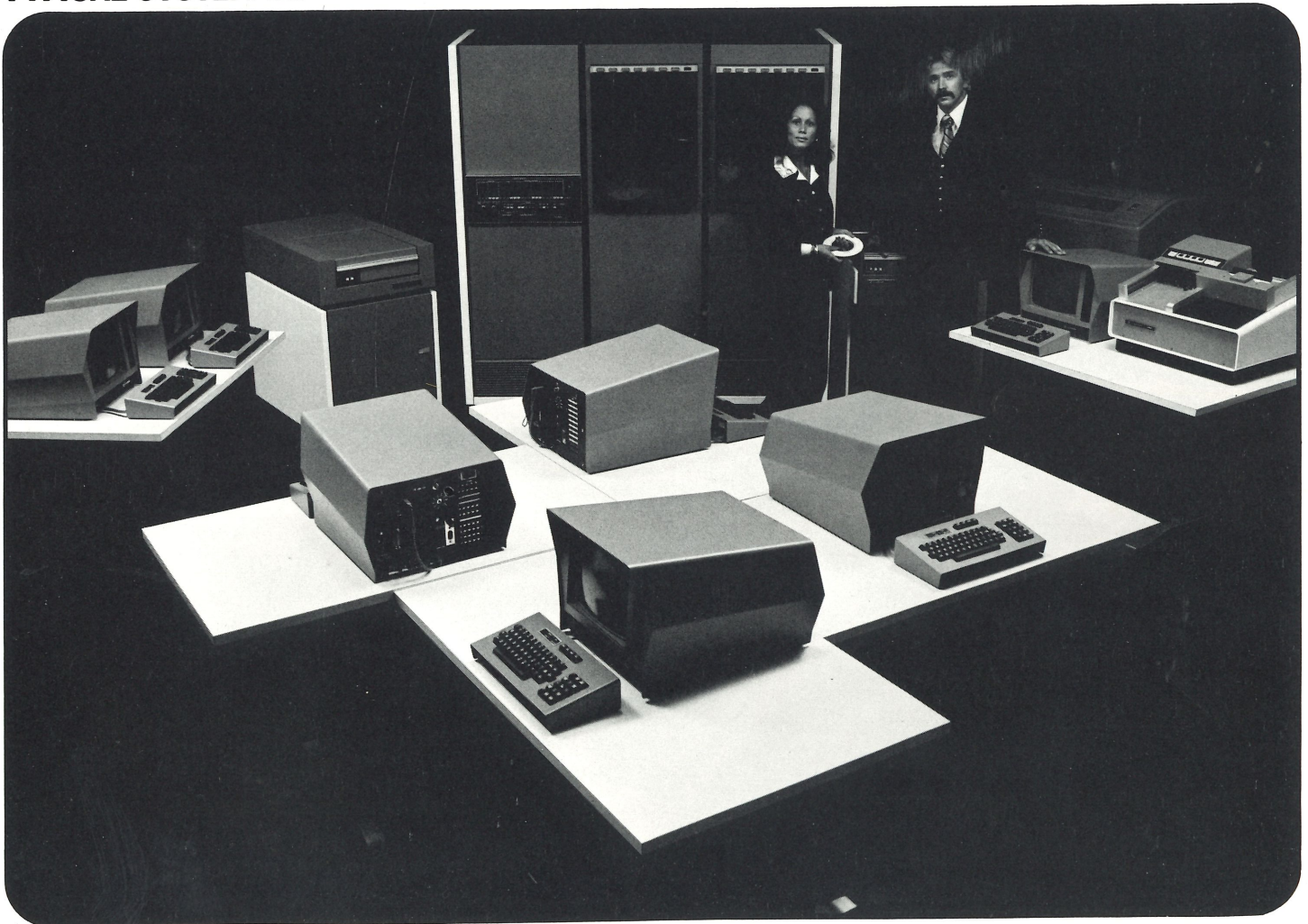
## SERIES 100/SYSTEM 125

System 125 serves a wide range of commercial and scientific applications. With its efficient VULCAN operating system and over three megabytes of virtual memory, System 125 can support up to 32 terminal users — while concurrently performing multi-stream batch processing and remote job entry operations in a true multi-use environment. System 125 includes a Direct Memory Access Communications Processor to meet the communication requirements of today's computer user. Extensive memory and I/O expansion capabilities are featured on the S125 — up to 624K bytes and 24 I/O channels, total.

The Harris System 125 is comprised of:

- Series 100 CPU (Model 6-6) with 144K Bytes of MOS Memory with Error Correction (expandable to 624K Bytes)
- 3072K Bytes of Virtual Memory
- System CRT with Keyboard and Controller
- 9 Track, 800 BPI, 45 IPS, Magnetic Tape Unit with Controller
- DMA Communications Processor with four Asynchronous Ports or one Synchronous Port
- All Processors and Support Libraries
- Virtual Memory Manager (VULCAN) Operating System

### TYPICAL SYSTEM 125





## SERIES 100/SYSTEM 135

The largest and most powerful of the Harris Series 100 Computer Systems, System 135 is designed to meet the extensive performance and growth demands expected in a multi-use environment. With more than 12 megabytes of virtual memory, System 135 provides the processor capacity and memory management required to support a large data base and a large number of interactive users — often in excess of 50. Real memory is expandable to 768K bytes and disc I/O is enhanced with the 40 megabyte Storage Module Drive — which has a 1.2 megabyte per second transfer rate.

The Harris System 135 is comprised of:

- Series 100 CPU (Model 6-7) with 384K Bytes of MOS Memory with Error Correction (expandable to 768K Bytes)
- 12,288K Bytes of Virtual Memory
- System CRT with Keyboard and Controller
- 40M Byte Storage Module Drive with Controller
- 9 Track, 800 BPI, 45 IPS Magnetic Tape Unit with Controller
- DMA Communications Processor with four Asynchronous Ports or one Synchronous Port
- All Processors and Support Libraries
- Virtual Memory Manager (VULCAN) Operating System

### TYPICAL SYSTEM 135





## TECHNICAL SPECIFICATIONS

### SERIES 100/SYSTEMS 115, 125 and 135 PROCESSORS

#### CENTRAL PROCESSING UNIT

Type	Microprogrammed, general purpose digital computer. Full word memory addressing. Central system bus. Buffered input/output channels.
Word Length	24 bits (3 bytes)
Arithmetic	Parallel, binary, fixed-point, two's complement number representation. Hardware multiply/divide/square root. Hardware double-precision, floating, point processor (SAU), optional.
CPU Micro-cycle Time	300 nanoseconds
<b>Memory</b>	
Type	N-Channel MOS, 4K by 1-bit RAM with 300 nanoseconds access time.
Configuration	48K bytes per memory module increment, interleaved modulo 2 or 4. Each module has a six byte mini-cache buffer.
Error Correction	Single bit error correction using a 5-bit Hamming Code per 24-bit word.
Power Failure Protection	Optional MOS Data Save (battery backup).
Operation	Demand paging virtual memory system in conjunction with a disc file.

#### INSTRUCTION EXECUTION TIME (microseconds)

Assumes no memory contention. Minimum floating point times given.

Instruction	Register to Register	Memory Reference	Double-Precision Floating Point
Arithmetic			
Add/Subtract	0.6	1.2	2.03
Multiply	6.0	6.3	6.18
Divide	12.6	12.9	11.88
Square Root	35.0	n/a	10.53
Algebraic Compare	0.9	1.5	2.48
Logical Compare	0.6	1.2	n/a
Input/Output	0.6	n/a	n/a
Shift n places	$0.9 + 0.15n$	n/a	n/a
Register Transfers	0.6	1.2	0.60

#### INPUT/OUTPUT CAPABILITY

Programmed Input/Output Channel (PIOC)	Transfers single 8-bit bytes to/from the A Register. Up to four integral device controllers and up to 12 external device controllers per PIOC.
Direct Memory Access Universal Block Channel (UBC)	Blocked 48-bit double word to/from memory. Two multiplexed 24-bit logical sub-channels per UBC. Up to 16 external device controllers per UBC. The maximum transfer rate is 4.98M Bytes per second.
Integral Block Channel (IBC)	Interleaved, blocked 24-bit words to/from memory. The IBC is dedicated to the Card Reader and Floppy Disc integral device controllers.
Channel Capacity	Seventeen I/O Channel cards, maximum with the expanded configuration.

#### PRIORITY INTERRUPT STRUCTURE

Internal	Eight executive traps
External	Sixteen priority interrupt levels, standard. Optionally expandable to 24 priority interrupt levels.
Control	External interrupts may be individually armed, disarmed, enabled, inhibited or triggered under program control.





## ELECTRICAL REQUIREMENTS

Voltage	230 VAC or 208 VAC + 10% (115 VAC + 10%, optional on S115 and S125)
Frequency	60 ± 3 Hz (50 ± 3 Hz, optional)
Current	19 Amps, RMS at 230V (maximum)
Power	4000 Watts
Phase	Single phase, 4-wire with NEMA L14-30R twist-lock connectors (250 VAC) on a 15 ft. power cord.

## ENVIRONMENTAL REQUIREMENTS

### Temperature

Operating	50° F to 113° F (10° C to 45° C), ambient air
Storage	32° F to 122° F (0° C to 50° C), ambient air

### Humidity

Operating	20% to 80%, relative (non-condensing)
Storage	20% to 90%, relative (non-condensing)

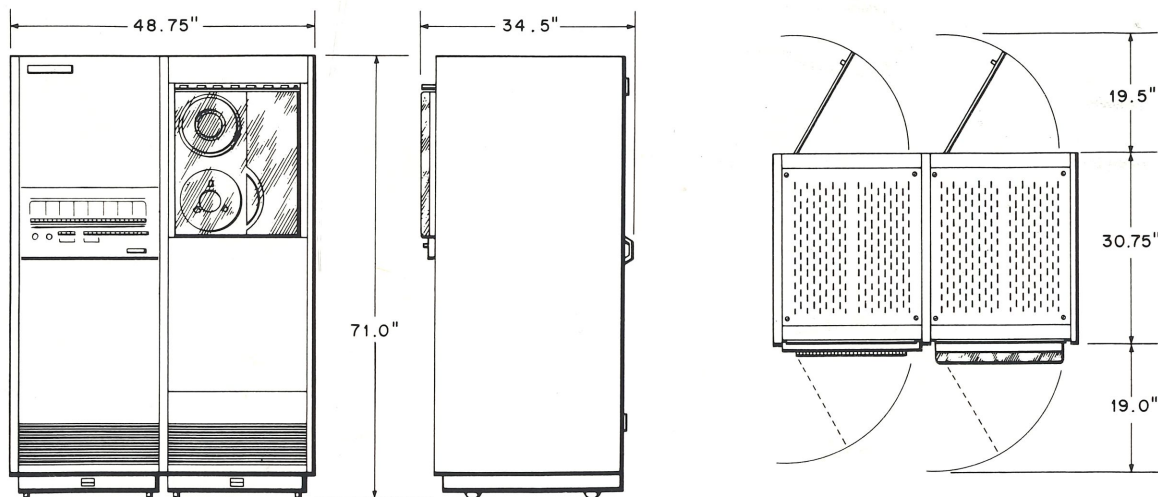
### Altitude

Operating	—1000 to 6000 ft. (—305 to 1829 m)
Storage	—1000 to 15,000 ft. (—305 to 4572 m)

**Heat Dissipation** 13,650 BTU/hour (3400 kg-cal/hour)

Cooling Forced air provided by internal fans on each chassis

Installation and Access See Below.



**HARRIS**



**COMMUNICATIONS AND  
INFORMATION HANDLING**

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